

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

REMARKS/ARGUMENTS

In the Office action dated January 8, 2004 the Examiner objected to the drawings, the specification and claim 7. In addition, claims 1 - 10 and 12 - 14 were rejected under 35 U.S.C. § 112, claims 1 - 4 and 6 were rejected under 35 U.S.C. § 102, and claims 1 - 6 were rejected under 35 U.S.C. § 103.

The Examiner stated that claims 7 - 10 and 12 - 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph.

By this Amendment, Applicant has amended claims 1 - 10 and 12 - 14. Reconsideration and reexamination are hereby requested.

Response to the Objection to the Drawings

The Examiner objected to the drawings on the grounds that certain features specified in claims 10, 12 and 14 are not shown in the drawings. Applicant has added a new Figure 6 to illustrate the features in question for claims 10 and 14. Applicant submits that the feature in question for claim 12 is illustrated in the drawings.

Claim 10

The objection regarding claim 10 relates to the language "light guide device." New Figure 6 is a modification of Figure 3 that shows light guides 16. In conjunction with this new drawing, Applicant has added a new paragraph to the specification after the paragraph beginning at page 8, line 28.

Applicant submits that no new matter has been added by these amendments. The amendment to the specification is

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

supported, for example, by the specification at page 5, lines 30 - 33 which states:

The means for beam deflection have in particular prisms or mirrors which are fixed or displaceable and which can have surfaces which are optionally curved for specific uses. In addition or alternatively thereto they may have a light guide arrangement (one or more glass fiber bundles).

The amendment to the drawings is supported, for example, by Figure 3 and the specification at page 5, lines 30 - 33.

Claim 12

The objection regarding claim 12 relates to the language "light diffuser device for producing a uniform light flux under object which is arranged behind projecting parts of the object." Applicant notes that Figure 3 depicts a light diffuser device 9.

The light diffuser is discussed in the specification, for example, at page 6, lines 5 - 9 and page 8, lines 16 - 21 which state:

Furthermore the apparatus preferably includes - especially for coplanarity checking procedures - a lighting device which in particular has a light diffuser device for producing a regular light flux under the object, which is arranged behind (from the point of view of the beam-deflection device) projecting parts of the object.

. . .

Figure 3 shows a detail of a modified embodiment of the arrangement shown in Figure 1, in which, in

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

addition to the components illustrated therein, there are provided two lighting devices 8a, 8b for producing top light on the surface of the object 1 and for producing transmission light for the side views of the legs 1.1 of the circuit 1, the transmission light being rendered diffuse by a light diffuser device 9.

As Figure 3 illustrates the light diffuser 9 may be positioned under the object 1 and behind the legs 1.1. Accordingly, Applicant submits that the light diffuser claimed in claim 12 is illustrated in the drawings.

Claim 14

The objection regarding claim 14 relates to the language "storage and evaluation unit integrated to form a structural unit." New Figure 6 is a modification of Figure 3 that shows an integrated image-recording device and storage and evaluation unit such as a smart camera 14. In conjunction with this new drawing, Applicant has added a new paragraph to the specification after the paragraph beginning at page 8, line 28.

Applicant submits that no new matter has been added by these amendments. The amendment to the specification is supported, for example, by the specification at page 6, lines 16 - 22 which states:

A preferred apparatus is one in which the image-recording device and the storage and evaluation unit are integrated in a structural unit. That can be for example a so-called 'smart camera', as however is hitherto not used for lead and mark inspection. The advantages of using an integrated component are that

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

on the one hand it is easily obtainable and on the other hand it can be easily configured for use in the context of the procedures described hereinbefore.

The amendment to the drawings is supported, for example, by Figure 3 and the specification at page 6, lines 16 - 22.

In view of the amendments and arguments set forth above, Applicant submits that the drawings are acceptable under 37 CFR 1.83(a).

Response to the Objection to the Specification

The Examiner raises three objections to the Specification in paragraphs 3, 4 and 5 of the Office action.

Paragraph 3

In paragraph 3, the Examiner has objected to the Specification on the grounds that it fails to provide proper antecedent basis for certain subject matter in claims 13 and 14.

Claim 13

The objection regarding claim 13 relates to the language "the light diffuser device is interrupted in such a way as to permit a view on to the side of the object which is remote from the or all image recording device or devices."

The light diffuser is discussed in the specification, for example, at page 6, lines 5 - 12 which states:

Furthermore the apparatus preferably includes - especially for coplanarity checking procedures - a lighting device which in particular has a light diffuser device for producing a regular light flux under the object, which is arranged behind (from the

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

point of view of the beam-deflection device) projecting parts of the object.

In that case the light diffuser device can preferably be interrupted in such a way that the free spaces permit a view on to the underside of the object.

In addition, the specification states, for example, at page 8, lines 16 - 21:

Figure 3 shows a detail of a modified embodiment of the arrangement shown in Figure 1, in which, in addition to the components illustrated therein, there are provided two lighting devices 8a, 8b for producing top light on the surface of the object 1 and for producing transmission light for the side views of the legs 1.1 of the circuit 1, the transmission light being rendered diffuse by a light diffuser device 9.

Moreover, the specification states, for example, in the Abstract, at lines 8 - 10 that "a plurality of partial images of the object are substantially simultaneously recorded by means of a number of image-recording devices and beam-deflection means."

Accordingly, in view of the above and Figure 3 which illustrates the how light from the diffuser may be reflected by prisms 5 to a remote camera 2, Applicant submits that the specification does disclose that the light diffuser permits a view on to the side of the object which is remote from at least one image recording device.

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

Claim 14

The objection regarding claim 14 relates to the language "storage and evaluation unit are integrated to form a structural unit." As discussed above in conjunction with the objection to the drawings relating to claim 14, Applicant submits that the specification does disclose this aspect of claim 14.

Paragraph 4

In paragraph 4, the Examiner has objected to the Specification on the grounds that on "page 6 of the disclosure at lines 1 - 4 it was unclear how the objective lens change the image scale . . ." Initially, Applicant notes that the cited paragraph refers to "a lens arrangement." Applicant refers the Examiner to Figure 1 and the specification at page 7, lines 16 - 25 which states:

The camera 2 records an overall image of the object 1, which is composed of a plurality of partial images of various views of the object. The light which is reflected from the top side 1a of the object and which passes directly into the objective lens 2a produces a partial image of the plan view, and the light which is reflected from the side surfaces 1b and which is deflected by the prisms 5 into the objective lens of the camera produces partial images corresponding to the side views. The lenses 6 produce a change in the imaging scale or the detailing of the recorded image in the parts of the beam path which are influenced by the lenses, that is to say in the partial images of the side views.

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

From the above, Applicant submits that the specification describes a lens arrangement that may provide one scale (e.g., via a given magnification by one lens 2a) for a portion of the image and provide another scale (e.g., via a different magnification by two lenses 2a and 6) for another portion of the image.

Paragraph 5

In paragraph 5, the Examiner has objected to the Specification on the grounds that on "the last paragraph of page 3 should be amended to exclude claim references" Applicant has amended this paragraph as set forth above.

Response to the Rejection Under 35 U.S.C. § 112

The Examiner has rejected Claims 1 - 10 and 12 - 14 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner rejected the claims on the grounds that the claims "are generally narrative and indefinite, failing to conform with current U.S. practice . . . and are replete with grammatical and idiomatic errors"

Applicant has amended all of the claims as set forth above to clarify the claims. Applicant submits that these amendments do not narrow the scope of the claims.

Response to the Rejection Under 35 U.S.C. § 102

The Examiner rejected claims 1 - 4 and 6 under 35 U.S.C. §102 as being anticipated by a publication by Schilling dated

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

July, 1998. Claim 1 is independent. Claims 2 - 4 and 6 depend on claim 1.

Applicant is filing concurrently with this Amendment a verified translation of the priority document for this application. The priority document was filed on May 15, 1998. Since the priority document predates Schilling and discloses the subject matter of claim 1, Applicant submits that claim 1 and, consequently, claims 2 - 4 and 6 that depend on claim 1 are not anticipated by Schilling.

Response to the Rejection of Claims 1 - 6 Under 35 U.S.C. § 103

The Examiner rejected claim 5 under 35 U.S.C. §103 as being unpatentable over Schilling in view of Suzuki et al. (5,909,285). Claim 5 depends on claim 1.

As discussed above, Schilling is not an anticipating reference to claim 1. Accordingly, Applicant submits that claim 5 is not obvious in view of the combination of Schilling and Suzuki.

The Examiner rejected claims 1 - 4 and 6 under 35 U.S.C. §103 as being unpatentable over Beaty et al. (5,909,285) in view of Csipkes et al. (5,729,662) and Willoughby Jr. et al. (5,619,587). The Examiner also rejected claim 5 under 35 U.S.C. §103 as being unpatentable over these references in view of Suzuki et al. (5,909,285).

Claim 1 is the sole independent claim. In response to Applicant's prior arguments the Examiner states in paragraph 16 of the Office action that "Beaty teaches or suggests 'locations at which the object comes very close to a support surface are

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

ascertained by analysis of the gray value distributions' for Beaty suggests that all locations and distances are determined from gray values (col. 8, lines 5 - 30)."

Applicant respectfully disagrees. Column 8, lines 5 - 30 of Beaty et al. is a portion of a discussion beginning at column 7, line 59 where Beaty et al. teaches how to measure lead dimensions. The leads dimensions being measured are depicted in Figures 10A - 10D. In this discussion, Beaty et al. states at column 8, lines 5 - 18:

The size of the region of interest is chosen such that only one lead is contained in the region so that no other adjacent lead is contained in that region of interest. Using nW, an expected width in pixels, and nL, an expected length available of the lead 50 up to the body of the part, an expected lead dimensions are found as shown in FIG. 10A. Within the region of interest, a processor finds a lead tip 51 by moving from the outside edge opposite the lead tip 51 toward the lead tip 51 one pixel at a time. The processor determines the pixel having the maximum gradient to be the edge of the lead tip dT. The gradient for each pixel is found by subtracting a gray scale value of the pixel from the gray scale value of the next pixel.

Thus, Beaty et al. only discusses that dimensions of a lead may be determine using pixel gray scale values. Beaty et al. make no other statements regarding gray scales. Accordingly, Beaty et al. does not state "that all locations and distances are determined from gray values" as suggested by the Examiner.

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

In addition, Beaty et al. does not offer any suggestion that gray scale may be used in other applications.

Moreover, Beaty et al. discloses nothing relating to ascertaining "locations at which the object comes very close to a support surface." There is nothing in Beaty et al. that suggests that its inventors were concerned with such a location. As best understood, Beaty et al. is simply concerned with the dimension and orientations of the leads. As a result, Beaty et al. is silent as to any method or structure relating to the cited claim language.

Also, in response to Applicant's prior arguments the Examiner states in paragraph 16 of the Office action that "'The light quantity which passes through between the object and the support surface and which is reflected in the pixels as an intensity value" [is] suggested from (Figs. 1b, 3a, 3b, 6-8; cols. 4-6).

Again, Applicant respectfully disagrees. Beaty et al. states in the Abstract that "a light source and overhead light reflective diffuser provide illumination." Accordingly, Beaty et al. teaches that light from the light source reflects off the lead 50 of the integrated circuit 30 back to a prism 40. The passages and figures from Beaty et al. cited by the Examiner disclose nothing regarding light passing "between the object and the support surface." Accordingly, Beaty et al. does not teach or suggest this aspect of claim 1.

Next, in response to Applicant's prior arguments the Examiner states in paragraph 16 of the Office action that "'the local light quantity pattern characterising the width of a gap

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

between the object and the support surface is determined' through the use of the particular edge and distance such as D_s and D_B used from col. 4, lines 30-35; col. 5, lines 20-65' col. 6, lines 1-30."

Applicant respectfully disagrees. The passages from Beaty et al. cited by the Examiner relate to locating the integrated in three dimensional space. These passages disclose nothing regarding "characterizing the width of a gap between the object and the support surface." Beaty et al. does not even mention such a gap. Accordingly, Beaty et al. does not teach or suggest this aspect of claim 1.

Finally, Beaty et al. does not teach or suggest that "the light quantity pattern is converted in accordance with a predetermined algorithm using calibration information into a gap width which is present between the object and the support surface." As discussed above, Beaty et al. does not teach or suggest anything regarding a gap between the object and the support surface.

Similarly, Csipkes et al. and Willoughby Jr. et al. say nothing regarding the above claim limitations.

Accordingly, Applicant submits that the invention of claim 1 is not taught by, described in nor suggested by the cited references. Accordingly, Applicant submits that claim 1 is patentable over the cited references.

Claims 2 - 6 that depend on claim 1 also are patentable over the cited references for the reasons set forth above. In addition, these dependent claims are patentable over these

Appln No. 09/700,572

Amdt date May 10, 2004

Reply to Office action of January 8, 2004

references for the additional limitations that the dependent claims contain.

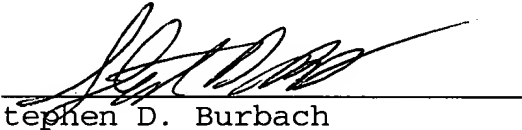
Conclusion

In view of the above amendment and remarks it is submitted that the claims are patentably distinct over the cited references and that all the rejections to the claims have been overcome. Reconsideration and reexamination of the above application is requested.

Respectfully submitted,

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